



UNITED STATES PATENT AND TRADEMARK OFFICE

40

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/993,496	11/27/2001	Tae-Duk Kim	1594.1017	8100

21171 7590 02/20/2004
STAAS & HALSEY LLP
SUITE 700
1201 NEW YORK AVENUE, N.W.
WASHINGTON, DC 20005

EXAMINER

SAYOC, EMMANUEL

ART UNIT PAPER NUMBER

3746

DATE MAILED: 02/20/2004

17

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.	Applicant(s)	
09/993,496	KIM, TAE-DUK	
Examiner	Art Unit	
Emmanuel Sayoc	3746	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on 26 January 2004.
- 2a) This action is FINAL.
- 2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 1,3-7,11-14,18 and 22-26 is/are pending in the application.
 - 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) Claim(s) _____ is/are allowed.
- 6) Claim(s) 1,3-7,11-14,18 and 22-26 is/are rejected.
- 7) Claim(s) _____ is/are objected to.
- 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on _____ is/are: a) accepted or b) objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) All b) Some * c) None of:
 - 1. Certified copies of the priority documents have been received.
 - 2. Certified copies of the priority documents have been received in Application No. _____.
 - 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) Notice of References Cited (PTO-892)
- 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) Notice of Informal Patent Application (PTO-152)
- 6) Other: _____.

DETAILED ACTION

1. This office action is in response to the amendments of 1/26/2004, and the request for continued examination (RCE), papers 16 and 15 respectively. In making the below rejections and/or objections the examiner has considered and addressed each of the applicants arguments. The examiner has reopened the claim prosecution in accordance to the filed RCE and has acknowledged the added limitations in independent claims 1, and 6.

Specification

2. The disclosure is objected to because: is does not provide adequate support as to how a collision of the piston with the valve is determined. Applicant is directed to the first paragraph of page 10 of the specification. The examiner cannot ascertain how step S40 is carried out. Additionally the specification does not provide adequate support as to what takes place in the event that a collision is detected, particularly what happens to the amplitude control of the piston step S41. Applicant is directed to page 10 of the specification line 10. The explanation here is inadequate.

The applicant is further instructed to properly distinguish every occurrence of the word "amplitude" (or similar). Particularly is the amplitude a preset reference, a changed reference, that of the piston, or that of the drive signal to the piston, etc etc.

Prior to the RCE, the specification and the claims were broadly directed to a compressor piston and valve plate anti-collision device, involving an amplitude reference, a measurement of piston amplitude, a comparison of reference amplitude and piston amplitude, and an adjustment

Art Unit: 3746

to the drive amplitude of the piston. As shown in prior prosecution, this general concept was well known in the art. In view of the new details added into the claims, new issues regarding the adequate disclosure of the operation of the device have become apparent. The art within piston anti-collision control of compressors is well-developed and detailed specifics on the nature of the control of the claimed invention is required to continue claim persecution.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claims 1, 3-7, 11-14, 18, and 22-26 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. For details see the objections to the specification as stated above.

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 1, 3-7, 11-14, 18, and 22-26 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Art Unit: 3746

In claim 1, line 9, the phrase “resetting maximum amplitude data of the piston of the linear compressor to reset the preset reference value” is ambiguous. How does changing the data also reset the reference value? Is the data the same as the reference value? Does the applicant mean the reference changes or, as the word “reset” implies, does it return to some original value? On page 8 of the specification, line 6, states that “the maximum amplitude is the maximum value allowing the piston of the linear compressor 100 to reciprocate without any collision, is preset when the linear compressor 100 is manufactured, and is storage in the first storage unit 341.” This is the reference value that is compared with the piston’s amplitude. The specification does not provide support that the reference value is reset nor is it changed. This is also evident from the process chart in Figure 4. The claim contradicts the specification and is therefore indefinite. Perhaps it is another reference value that is being reset. The applicant is instructed to clarify this issue.

Claim 6, line 10, claim 8 line 8, contains the same limitation and also suffers from the same flaw. In line 13, the phrase “according to ” is ambiguous.

Claim 7, lines 10-14, are ambiguous. The examiner cannot determine how the compressor operates after a collision is detected.

Claim 22, line 8, “according to collision results of the piston” is ambiguous. What results are being referred to. Extent of collision results, the result of a comparison perhaps? The examiner cannot determine how the compressor operates after a collision is detected. Furthermore if there is no collision, then there are no collision results.

With respect to claims 1, 3-7, 11-14, 18, and 22-26, the claims (and the specification) is replete with phrases such as “preset reference value (example claim 1)”, “maximum amplitude

Art Unit: 3746

data (example claim 1),” “reset the preset reference value (is this still the preset value then? example claim 1),” “preset maximum amplitude data (example claim 1),” “reset maximum amplitude data (example claim 1),” “preset maximum amplitude reference value (example claim 6),” “reset maximum amplitude reference value (example claim 6),” “a value corresponding to the preset maximum amplitude of the piston (example claim 7),” “peak amplitude of the piston (example claim 11),” “maximum amplitude of the piston (example claim 12),” etc. etc. These are all “amplitude phrases.” The point is the applicant uses multiple “amplitude phrases” without consistency. The claims are therefore indefinite.

The applicant is required to use a limited number of “amplitude phrases.” The applicant is free to use his discretion in adopting a naming convention for the amplitudes. The applicant is required either in the specification or in a separate document to provide a listing of all the “amplitude phrases” used and a brief definition as to what they refer to.

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in-

(1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or

(2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

Art Unit: 3746

8. Claims 1 and 7, (as understood given the 35 U.S.C. 112 discrepancies) are rejected under 35 U.S.C. 102(b) as being anticipated by Yamamoto et al. (U.S. Pat. 5,897,296).

Yamamoto et al. in Figure 1 disclose a control apparatus for a linear compressor comprising a collision detection unit (generally shown in Figure 1) for detecting collision of a piston (12a) with a valve (15, 16), and a driving force control section (16a, see column 4 lines 5-25 computer processing and calculation) for determining whether the collision of the piston occurs on the basis of an output signal from the collision detection unit (Figure 1) – see abstract, column 3 lines 1-44, column 5 lines 3-20, column 6 lines 22-42, column 9 lines 5-52, and column 11 lines 5-29. The apparatus includes a displacement detecting section (14a) for determining the position of the piston, and an upper dead point position (peak amplitude) detecting section (15a) for detecting the pistons upper dead point position, which is compared to a preset upper dead point reference valve (31). The driving force control section (16a) is analogous to the claimed inventions control unit, and it resets the maximum amplitude data of the piston of the linear compressor when collision occurs – see column 9 lines 6-52, and column 11 lines 5-39. The control apparatus further comprises a compressor-driving unit (13a) for controlling the maximum amplitude of the piston of the linear compressor under the control of the driving force control section (16a).

Art Unit: 3746

The collision control apparatus of Yamamoto et al. is designed to prevent collision and damage of the intake valve (15) and the ejector valve (16) in the cylinder (11) due to the collision of the piston (12a) with the top of the cylinder (11) – see column 15 lines 51-53.

A piston/compressor driving unit (13a), which is analogous to the claimed inventions compressor-driving unit, controls the maximum amplitude of the piston of the linear compressor under the control of the driving force control section (16a).

The control circuit of the Yamamoto et al. apparatus comprises an amplitude control means (30) primarily consisting of an amplifier (32) which compares an upper dead point position signal from the upper dead point position calculation means (28) with an upper dead point reference value (31) stored in memory in the inverter control means (29) and changes an output voltage amplitude for the base drive circuit (26) in proportion to a difference between them - see column 10 lines 43-58.

Yamamoto et al. makes several references to memory and data storage, for the upper dead point reference value column 3, lines 25-44, and for other data column 19 lines 18-19. It is inherent that any complex computer or data processor would have some sort of data storage unit. Since the computer in this situation is a compressor collision control unit, vast amounts of data are needed, computed and updated. Memory storage that is non-volatile and capable of data reading/writing is inherent in a stable and dynamic control system. It is also inherent that the different pieces of data, being separate and pertain to different components, are stored on a first, second, third, and so on, memory storage unit. The term “unit” is interpreted as a specific section or location on a storage device that is comprised of a vast plurality of memory “units.”

Art Unit: 3746

As stated above, the new limitation, "to reset the preset reference value," is inadequately supported and is hereby broadly interpreted. The detected peak of the compressor for example constitutes a reference value that is periodically changed during compressor operation.

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. Claims 6, and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamamoto et al. as applied in claim 1.

With respect to claims 6, and 18, Yamamoto et al., due to the disclosure of the apparatus of claim 1, inherently disclose a method of controlling a linear compressor comprising, a) presetting a maximum amplitude of a piston of the linear compressor (the amplitude of the piston is preset given a preset input, i.e. a preset driving force and frequency at the startup of the compressor) detecting a signal when the linear compressor operates (displacement detecting unit 14a), c) determining whether any collision of the piston has occurred on the basis of the detected signal (comparing and making calculations with the signal from section 14a and 15a, a preset top dead center reference value 31), d) resetting the maximum amplitude if it is determined that a collision of the piston has occurred (control and drive sections 16a and 13a respectively), and e) driving the linear compressor according to the reset maximum amplitude (driving section 13a). Refer to the cited sections above for specific details. When a collision is detected, i.e. when the

Art Unit: 3746

upper dead point position (from 15a) exceeds the upper dead point reference value (31), the driving force, frequency, and therefore the maximum driven amplitude of the piston is reduced and reset to a different value – see column 9 lines 16-27, and column 11 lines 6-22.

Response to Arguments

11. Applicant's arguments filed 1/26/2004, paper 16, have been fully considered but they are not persuasive. The applicant relies upon new added limitations to the claims regarding “resetting preset reference amplitude.” As stated above this limitation lacks proper support in the specification and is therefore unclear. The examiner cannot determine what amplitude the applicant is referring to. Based upon a broad interpretation of the limitation, the examiner holds the rejection of claims 1, 6, 7, and 18 under Yamamoto et al. The drive amplitude provided to the piston or the detected peak of the piston are both amplitudes that constitute reference values subject to change and resetting.

Allowable Subject Matter

12. Prior to the RCE claims 3-5, 11, 12-14, and 22-26 were identified as containing allowable subject matter.

Claims 3-5, 11, 12-14, and 22-26 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, first and second paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

Conclusion

13. The applicant is invited to conduct an interview with the examiner in order to expedite claim prosecution.

14. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The following references are cited to further show the state of the art with respect to collision detection and control systems for linear compressors/motors.

U.S. Pat. App. 2002/0064461 A1 to Yoo et al.

U.S. Pat. App. 2003/0129063 A1 to Jeun – teaches a device for controlling the piston position in a linear compressor by comparing phase differences in square waves indicative of supply current and piston stroke.

U.S. Pat. 6,663,348 to Schwarz et al. – teaches a device for preventing piston collision by measuring the movement time of the piston, comparing the movement time with a foreseen movement time, and altering the voltage of the if the times are outside a given threshold.

U.S. Pat. 5,980,211 to Tojo et al. – teaches gradual modification of compressor drive frequency and amplitude to match reference values in order to prevent piston collision. A current instruction value is compared to a current amplitude of the piston.

U.S. Pat. 5,496,153 to Redlich – teaches the evaluation of the alternating and average components of the piston position by direct measurements of voltage and current.

U.S. Pat. 5,342,176 to Redlich – teaches a method of measuring the distance between the piston top dead center and the valve plate.

U.S. Pat. 6,074,172 to Huang


Art Unit: 3746

Contact Information

15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Emmanuel Sayoc whose telephone number is (703) 305-0054. The examiner can normally be reached on M-F 8 A.M. - 6 P.M..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Justine Yu can be reached on (703)308-2675. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


Emmanuel Sayoc
Examiner
Art Unit 3746

ECS


JUSTINE YU
SUPERVISORY PATENT EXAMINER

2/17/04